EXECUTIVE SUMMARY
ENVIRONMENTAL IMPACT ASSESSMENT REPORT
CEMENT PLANT PROJECT
2 MILLION TONS PER ANNUM
(Flyash and Slag Based)

vill–Gejamuda, tehsil & Dist-Raigarh,
(Chattisgarh)

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JINDAL STEEL & POWER LIMITED
RAIGARH CHHATTISGARH

SEPTEMBER 2007
1.0 Introduction

Jindal Steel & Power Limited (JSPL) proposes to set up 2 million tons per annum Cement Plant near village Gejamuda, tehsil Raigarh, Chattisgarh. 200 acres land has been selected for the plant. The land is mostly single-crop agriculture land. No forest land is involved in the proposed site. The project cost is about Rs.605 crores. The proposed site fulfills the guidelines prescribed by the Ministry of Environment and Forests. The Ministry of Environment & Forests, Government of India has approved the Terms of Reference for the Environmental Impact Assessment Study on 28th May 2007.

2.0 Process Description

In order to manufacture cement, raw materials like limestone, iron ore fines, clay and gypsum are grounded and mixed. The mixture is fed to kiln where coal is applied to heat the mixture and cement is produced.

The following raw materials will be required for cement manufacturing.

<table>
<thead>
<tr>
<th>Name of Raw Materials</th>
<th>Quantity (tons per day)</th>
<th>Source</th>
<th>Transportation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Limestone (ROM)</td>
<td>4000</td>
<td>Mines located in Raigarh / neighboring district</td>
<td>Road</td>
</tr>
<tr>
<td>2 Limestone (Sweetener grade)</td>
<td>450</td>
<td>Imported</td>
<td>Rail</td>
</tr>
<tr>
<td>3 Clay</td>
<td>290</td>
<td>Raigarh district</td>
<td>Road</td>
</tr>
<tr>
<td>4 Iron ore fines</td>
<td>25</td>
<td>Steel plant of JSPL</td>
<td>Internal road/conveyor</td>
</tr>
<tr>
<td>5 Coal (Washed / Beneficiated)</td>
<td>500</td>
<td>Steel plant of JSPL</td>
<td>Internal road/conveyor</td>
</tr>
<tr>
<td>6 Gypsum/Phosphogypsum</td>
<td>225</td>
<td>From Orissa</td>
<td>By road</td>
</tr>
<tr>
<td>7 Flyash</td>
<td>1010</td>
<td>Steel plant of JSPL</td>
<td>Internal road/conveyor</td>
</tr>
<tr>
<td>8 Blast Furnace Granulated Slag</td>
<td>1500</td>
<td>Steel plant of JSPL</td>
<td>Internal road/conveyor</td>
</tr>
</tbody>
</table>

The cement manufacturing process involves following stages.

Raw Material Handling, Crushing / Grinding
Raw Meal Homogenizing
Pyro-Processing (using Pre-heater, Kiln & Cooler)
Clinker Storing & Handling
Fly ash Storage and Transport
Clinker & Slag Grinding
Cement Making in Mill
3.0 Description of the Environment

No notified ecologically sensitive areas like national park, wildlife sanctuary and biosphere reserve exists within 10 km radius of the proposed site. Kelo river and Mand river, Urudhana and Rabo forests are located within 10 km from site. The historic Singhanpur caves are located in the west of Rabo forests, at a distance of more than 10 km away from the proposed project site.

Baseline environmental data generation of study area was carried out during the summer season 2007. The predominant wind direction is from northeast sector. The average wind speed is 4.8 kmph. Daily mean temperature varied from 22°C to 38°C. The relative humidity varied from 40 - 65%. The annual rainfall is 1602 mm. The RSPM, SO$_2$ and NO$_2$ levels were monitored at eight locations in the study area. The baseline air quality levels are within the National Standards prescribed for residential area (Standards are 100, 80 and 80 µg/m$^3$ for RSPM, SO$_2$ and NO$_2$ respectively). Ambient noise levels were monitored at 8 locations in the study area. The baseline noise levels are well within the National Standards (55 dBA-day time and 45 dBA-night time). Three surface water samples and seven groundwater samples were collected from the study area and site for chemical analysis. The water quality of Mand river and Kelo river upstream of Raigarh city is good. The Kelo river water quality along and downstream of Raigarh city is very bad due to discharge of untreated domestic sewage. The groundwater quality is fit for potable use. No metallic or bacterial contamination was found in the groundwater samples. Seven soil samples were collected from the study area and analysed. The texture of soil is sandy loam. The organic matter, nitrogen, potassium and phosphorus content of the soil are moderate. The pH and conductivity of all the soil samples are within the acceptable range.

No endangered species of plants and animals has been found in the study area.

The total population of Raigarh tehsil is 364287 and Raigarh city is 115908 (2001 Census). The population density is 400 persons per square kilometer. Agriculture and industrial workers dominate the occupation structure. The study area has one major
industry, Jindal Steel and Power Limited (JSPL), besides several rice mills. The basic infrastructure facilities of the study area are well developed. There are 57 functional industrial units in the district and 14 units are under various stages of construction / expansion. Due to the huge coal deposits in Raigarh district several coal mines and thermal power plants are under development.

4.0 Mitigation Measures & Environmental Impact

**Air Quality:** Water spraying will be done to suppress the dust generated during construction activity. Dust will be controlled using ESP and Bag Filters and the emission will be less than 50 mg/Nm\(^3\). Tall stacks will be installed to disperse gaseous pollutants over a wide area. All internal roads will be made pucca. All roads and shop floors will be cleaned regularly. Fugitive dust from material handling yard will be controlled using water sprinkling. Mathematical modeling predicted that the maximum incremental ground level concentration of RSPM, SO\(_2\) and NO\(_x\) from the project would be 4.0 \(\mu g/m^3\), 1.5 \(\mu g/m^3\) and 1.4 \(\mu g/m^3\) respectively. The incremental impact is perceptible till 1 to 2 km radius of the proposed plant. The ambient air quality standards of surrounding area will remain well within the prescribed air quality standards for residential area. This will not create any adverse impact on human health and ecology.

**Noise Quality:** Unloading and hauling operations and movement of trucks and dumpers will be properly scheduled to minimize construction noise. Vehicular movement on the village roads will be avoided. The compressors and rotating machines will be the major sources of noise generation. All activities will be carried out inside sheds and maintenance program for equipment will be routinely followed. Sound absorbing materials will be provided in the room where both the source and receiver are present so that the reflecting sound is absorbed. Greenbelt will be developed, which will reduce the noise level. In noisy work areas soundproof duty rooms will be provided. Workers working in noisy areas will be given ear plugs. In this manner the noise level will be restricted within the plant boundary and meet the standards of 75 dBA during day time and 70 dBA during night time.

**Water Drawl:** 58 kl/hour water required for the project will be taken from JSPL plant. There is surplus treated water available with the steel and power plant, which will be
adequate to meet the requirement of cement plant. Rainwater harvesting pits will be constructed inside the plant premises and rooftop rainwater will be diverted towards these pits for recharging the groundwater.

**Water Quality:** Sedimentation pits with oil separator will be constructed to trap the silt-laden water arising from site offices, canteens and other washing facilities at the construction site. The overflow will be reused for dust suppression. Cooling tower blowdown water generated from the plant operation will be reused for dust suppression. Domestic wastewater will be treated in Sewage Treatment Plant and reused for gardening. The storm water drain will be kept separate from wastewater drains. The storm water drain will have sedimentation pits and oil-water interceptors. The storm water during rainfall will be discharged into nearby nalla. Spent oil and lubricants will be collected in drums and given to authorized recyclers.

**Soil Quality:** The soil quality of the site and surroundings is sandy loam. The infiltration rate of the soil is moderate. Air pollution control devices will be installed at all points to trap the dust from going outside. Solid wastes generated from the air pollution control devices will be reused in process. No solid wastes will be dumped on land, hence there will be negligible impact on the soil quality.

**Ecology:** Dust emission from the plant will be controlled using ESP and Bag Filters. Gases will be dispersed using tall stacks. All air emissions will be kept within the prescribed standards. The incremental air pollution will be accommodated within the air quality standards. Wastewater and solid waste will be reused. Greenbelt and greenery will be developed on 33% land area, that is 66 acres land. Such measures will be adequate to protect the surrounding ecology.

**Public Health:** The national ambient air quality standards prescribe level of air pollutants that will protect public health and vegetation. Air quality dispersion modeling study proved that the ambient air quality of the area will remain within the national air quality standards. Entire wastewater generated from the plant will be reused. No toxic chemicals or wastes will be handled in the plant. Hence there will be no risk to public health.

**Land:** No forestland will be acquired for the project. Land losers will be financially compensated and rehabilitated. Since no minerals or building materials will be
extracted from the site, topography of the site remains unaffected. The project will involve minor site preparation and leveling work. It will be ensured that adequate drains and garland drains are constructed conforming to the existing drainage pattern so that the alteration is kept to the minimum and flooding does not occur.

**Demography and Socio-economics:** The average labour force will be 500 during the construction period of 22 months. The bulk of labour force will be unskilled and semi-skilled who will be recruited from the surrounding villages. 246 people will get direct employment in the cement plant and 103 people in limestone mines. About 1000 people may get indirect employment from the plant. The infrastructure facilities of the area will be developed. The overall socio-economic condition of the area will improve.

**Accident Risk:** No hazardous or toxic chemicals will be handled inside the cement plant. Hence there is no risk to human population and property of surrounding areas. The hazards of cement plant are only due to mechanical injury, which will be reduced by use of standard design and risk mitigation measures.

**5.0 Environmental Monitoring Plan**

Environmental Management Department (EMD) will be under the direct control of Chief Executive. Full-fledged environmental laboratory will be created. Qualified scientists and engineers will be recruited. The following work will be looked after by the Environmental Management Department.

1. Regular monitoring of stack emissions, fugitive emissions work environment and report any abnormalities for immediate corrective measures.

2. Regular monitoring of ambient air quality at plant boundary and outside the plant in upwind and downwind direction.

3. Regular monitoring of re-circulating water quality, ground water quality and surface water quality.

4. Regular noise monitoring of the work zone, equipments/ machines and outside the plant.

5. Green belt plantation, maintenance, development of other forms of greenery like lawns, nursery, gardens, etc. in the plant premises.
6. Regular monitoring of quantity and quality of solid waste and their reuse in cement plant.

7. Development of schemes for water conservation, rain water harvesting and reuse of treated wastewater. The EMD will carry out air, water and noise monitoring around construction sites. On-line stack emission monitors will be installed in all the major stacks. Continuous on-line ambient air quality monitoring stations will be installed at one location, downwind of the plant. The monitored data of the stack emissions and ambient air quality will be provided to State Pollution Control Board at regular intervals. Temperature, pH, conductivity and dissolved oxygen testing will be done for wastewater that is reused for gardening.

6.0 Project Benefits

There is no large and medium cement plant in Raigarh district. The slag and flyash generated from the steel plant are sent to neighboring districts of Raipur and Bilaspur for cement making. Raigarh district has witnessed massive urbanization and industrialization in the past 10 years. The growth is expected to continue for next 50 years. Large deposits of coal in Raigarh district have opened new avenues for thermal power plants and steel plants. This translates to huge demand of cement in Raigarh district. The direct project benefits are as follows:

1. Utilisation of about 500000 tons/year of slag to be generated from JSPL's blast furnace.

2. Utilisation of 330000 tons/year of fly ash generated from JSPL's captive thermal power plant.

3. Utilisation of 8300 tons/year of iron ore fines from JSPL's steel plant.

The limestone deposits of Raigarh and neighboring districts are small and scattered. None of the mines are connected by Rail. It is not feasible to locate the cement plant at one such limestone deposit. Even though the cement plant is located near one such limestone mine it will involve 83 truck movements daily to transport sweetener grade limestone, iron ore fines, slag and flyash from the steel plant of JSPL at Raigarh. On the other hand if limestone is transported to the proposed site by road, it will involve movement of daily 100 trucks. However the transportation of in-plant materials; 83 truck movements daily will be saved. [40 tons capacity dumper trucks]
100 skilled and 146 semiskilled / unskilled workers will get direct employment from the cement plant. Another 103 people will be employed in the limestone mines. During the construction phase, 500 people on an average are likely to be employed for construction related activity for 22 months. Several other types of indirect employment opportunity will be created in the surrounding area due to this project. Transport business, vehicle drivers and attendants, workshops, grocery and retail, hospitality, medical, school, coaching centers, technical institutes, hotel and restaurants, self employed persons like tailors, carpenters, plumbers, electricians, etc will get indirect job opportunity.

7.0 Environmental Management Plan

The EMP will establish a framework for the effective management of environmental impacts and ensure the best overall protection of the environment through appropriate management procedures. Rs.19.7 crores has been earmarked as capital cost of pollution control systems. The annual recurring cost will be about Rs 2 crores. Environmental Management System (ISO 14000) will be instituted in conjunction with this EIA report.

Environmental Management during construction phase will be the responsibility of contractor. JSPL will introduce requisite provisions in the contract documents and the contractor will develop a contract specific plan and designate staff responsible for pollution control. The EMD will supervise the contractor's obligation for mitigating the environmental impact during construction phase.

The EMD will ensure that all air pollution control devices, effluent treatment plants and water re-circulating and reuse schemes are functioning effectively. EMD will also supervise and monitor the handling, transport and disposal of spent oil and lubricants and used batteries as per the approved authorization. EMD will promote use of ozone friendly refrigerants. EMD will quantify the emission rates of greenhouse gases and explore adoption of clean development mechanism.

Greenbelt and greenery development inside and outside the plant premises will be done by the EMD. Greenery development on 33% land will be started during the construction phase. Guidelines issued by the Central Pollution Control Board (CPCB)
on greenbelt development will be followed and district forest department will be consulted for selection of trees.

First aid center will be established inside plant premises, which will be equipped with paramedical staff, medicines, vehicle and other medical equipment. The workers will continue to be periodically checked for any clinical complaints and abnormal symptoms by the in-house medical department. EMD will ensure clean work place and implement use of personnel protective equipment in consultation with the safety department. EMD in association with the safety department will undertake full review of the potential hazard scenarios during plant commissioning. The review will confirm the proposed safeguards for accident prevention and minimisation and update the assessment of consequences.

Regular audits against an EMP will be undertaken to ensure that all actions and procedures are being carried out effectively. As part of the audit, inspection reports will be recorded that form part of the review and revision procedure for the EMP. The monitoring and reporting regimes includes defining responsibilities for implementation of each elements of the EMP, specifications for management procedures, duties of contractors, auditing, checking and implementation of corrective actions, training and awareness building, communication on environmental matters and checking, reviewing and up-dating the EMP document as and when necessary. The implementation of EMP would ensure that all elements of project comply with relevant environmental legislation.

With the effective implementation of mitigation measures and Environmental Management Plan during detailed design, construction planning, construction and operation the project will create minimum adverse impacts that will be manageable.

The beneficial impacts from this project are direct and indirect employment generation, development of infrastructure facility and Public-Private participation in village development scheme at the community level. The positive economic output from this project will improve the overall quality of life of people living in the region.